

RESTRICTED CIRCULATION

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AGRICULTURAL MEMORANDUM NO 571

Solar Radiation at Cambridge - Part II

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Following on from Agricultural Memorandum No 559, where daily means of sunshine and solar radiation over periods of a month were used to compute regression equations, it was felt that estimates at closer intervals were desirable, especially with regard to current investigations into cereal growth.

To this end, daily means over periods of a week were extracted for Total Solar Radiation (Q) and sunshine (n) for Cambridge from magnetic tape stores at Bracknell. Weekly daily means of QA (that radiation which would fall on a horizontal surface through a transparent atmosphere) and N (day length) for Cambridge were extrapolated from the Smithsonian Meteorological Tables. The ratios Q/QA and n/N were calculated for each weekly daily means from 1957 to 1969 (the total period for which complete data are readily available). Linear regression equations were computed of the form $Q=QA(a+b \frac{n}{N})$ using the weekly daily means appropriate to, each month, each season, each half-year and the year. These are appended as Table 1.

Correlation between the data appropriate to each month are very reasonable, except for the months of January and February.

For the significant part of the year, "the growing period", the six monthly equation gives as good agreement as that of the individual months. Except when very low values of n/N occur in April there would seem little point in using the individual monthly equations for this period.

For estimates of solar radiation during the "Winter Period" it is probably better to make use of the monthly equations, although for most cases the estimates from the six monthly equation comes within 10% of those obtained from the shorter monthly periods.

It is interesting to note that the yearly equation obtained using weekly daily means ($a = .16$, $b = .61$) is very close to the one obtained by monthly daily means ($a = .16$, $b = .64$).

It is felt that these equations will hold good for other sunshine stations of similar exposure in the Eastern Region.

REFERENCES

HARVEY, L.D.J., Solar Radiation at Cambridge - Part I, Ag. Mem, No559,

SMITHSONIAN INSTITUTION, WASHINGTON; The Smithsonian Meteorological Tables
6th revised edition.

August 1973
Meteorological Office,
Cambridge.

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TABLE I

	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR
EST. OF α .	.18	.21	.23	.23	.21	.21	.18	.16	.14	.16	.18	.16
EST. OF b .	.61	.54	.51	.52	.52	.51	.56	.53	.52	.49	.44	.61
CORR. COEFF.	.94	.93	.95	.93	.94	.91	.95	.93	.94	.85	.85	.97

	SPRING	SUMMER	AUTUMN	WINTER
	.20	.22	.15	.16
	.56	.51	.58	.58
	.94	.92	.93	.92

	GROWING PERIOD	WINTER PERIOD
	.21	.15
	.54	.58
	.93	.92

	YEAR
	.16
	.61
	.93

VALUES OF α & b IN REGRESSION EQUATION $Q = Q_A (\alpha + b \frac{D}{N})$ FOR VARIOUS PERIODS OF THE YEAR TO GIVE WEEKLY ESTIMATES OF DAILY SOLAR RADIATION (T) FOR ANYWHERE IN THE EASTERN REGION, USING LOCAL VALUES OF Q_A AND $\frac{D}{N}$.